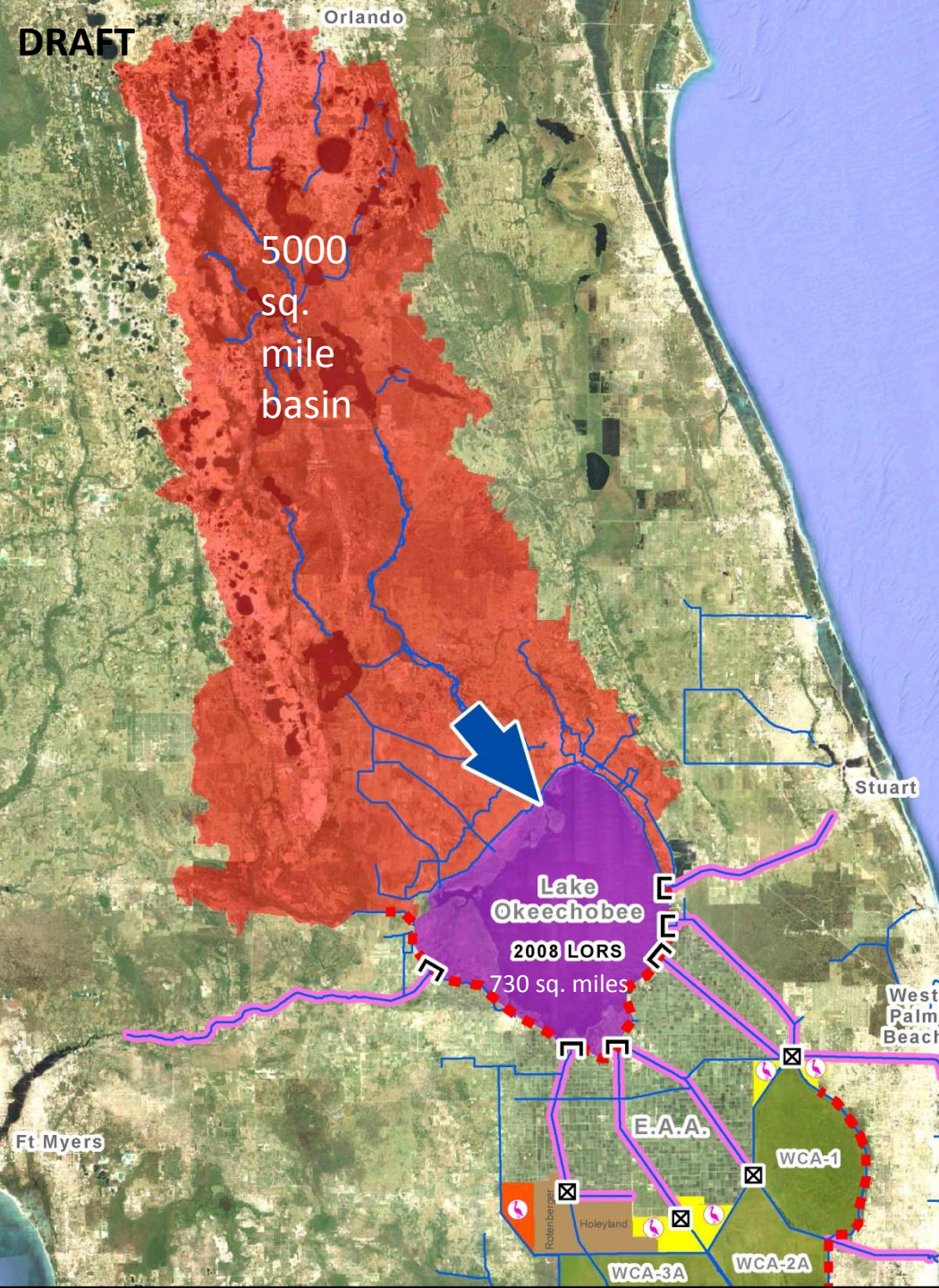


Symbol	Constraint
	Weather Patterns
	Herbert Hoover Dike
	2008 LORS
	Structure Capacity
	Canal Conveyance
	Species protection
	STA Treatment Capability
	Pump Capacity
	STA 5 / 6 Connectivity
	Wildlife Management Area
	Water Level Limitation (Tree Islands & Wildlife)
	LEC Canal Conveyance
	Levee Safety
	Flow Limitation
	Flood Risk (G3273, SDCS)



LAKE OKEECHOBEE

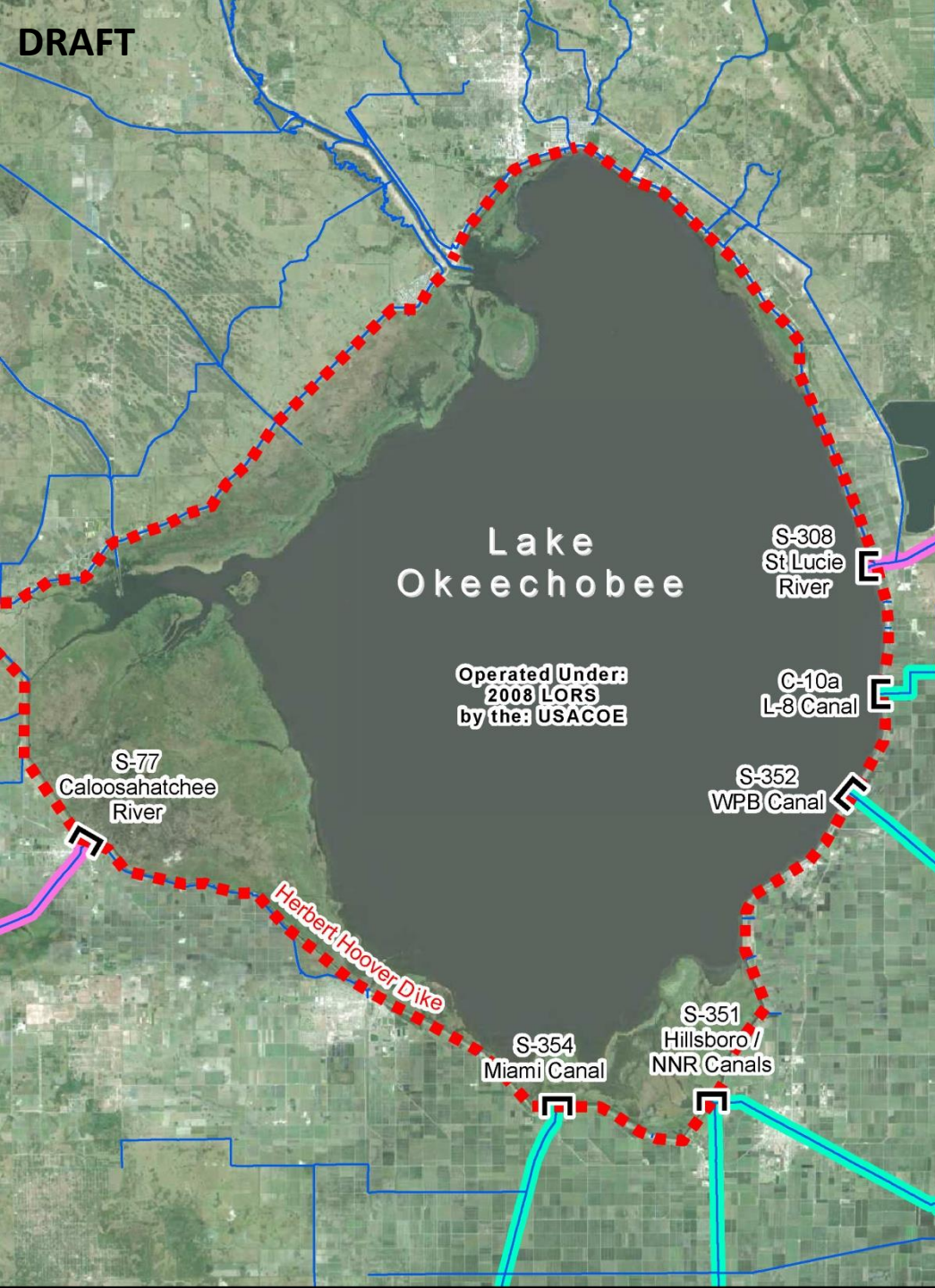
The largest constraint is the weather!

No ability to reduce the water that is coming into the Lake from the North

5000 sq. mile basin draining into 730 sq. mile Lake

Lake stage rises and falls with the major weather systems affecting Florida

Options for moving water out of the Lake are severely constrained on where you can and cannot send water



US Army Corps of Engineers 2008 LORS (Lake Okeechobee Regulation Schedule):

Herbert Hoover Dike—dam safety issues at high levels create risks to human life & safety. Deficiencies in the dike led to development of 2008 LORS

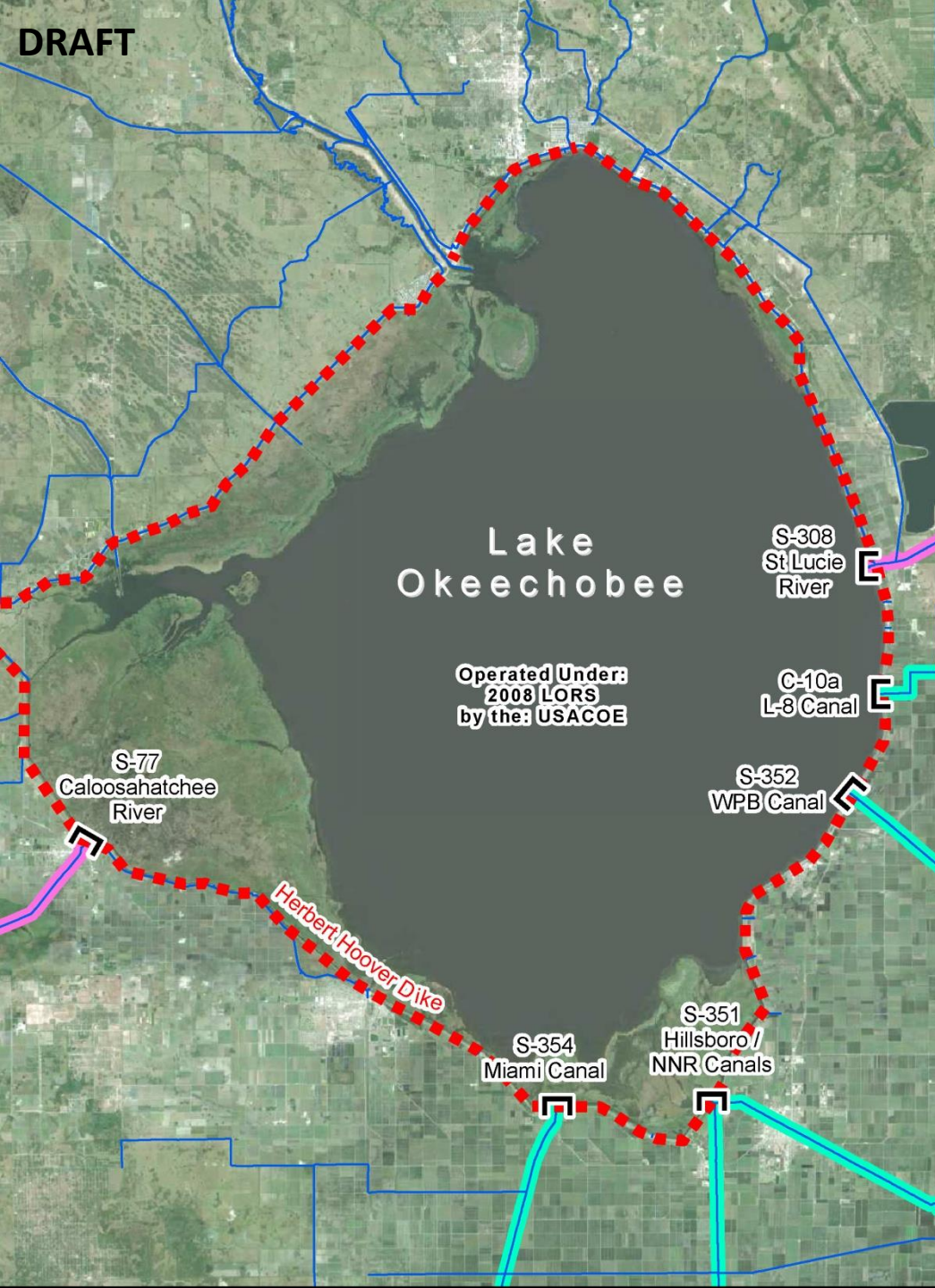
Risk assessment determined that repairs to dike must be complete before increases in lake stage, even temporary, will be possible.

There is NO current flexibility in the schedule that would allow temporary relief from high discharges to the estuaries that occurred in 2013. The dam safety issue drove the need to move water out of the Lake to avoid safety risk

2008 LORS must also considers the ecology of Lake Okeechobee

At lower lake levels, water supply for urban water utilities, environmental needs and permitted agricultural uses must be met.

It is expected that when the dike repairs are complete, the Corps would consider a new regulation schedule that incorporates more flexibility to balance all the affected interests downstream of the Lake, the Lake itself, and reduce the discharges to the estuaries.



STRUCTURE CAPACITY:

Trying to move water out of Lake Okeechobee

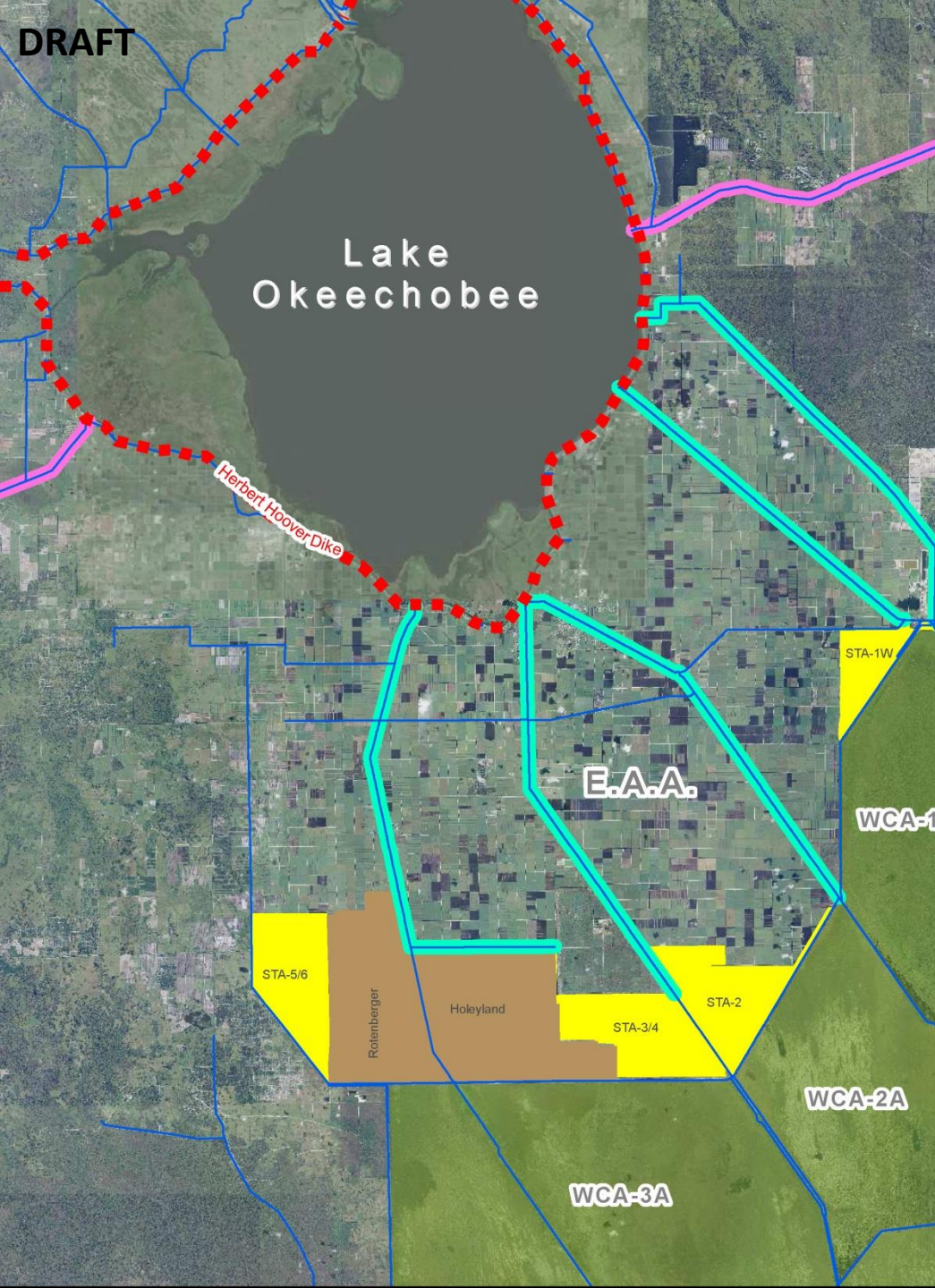
Water leaving the Lake must pass through structures that have a maximum capacity that varies depending on upstream and downstream conditions

The existing structures are not sufficient to pass high volumes from the Lake to the Everglades

The four structures to the south have a peak capacity of 6000 cfs while the northern inflow is as high as 40,000 cfs, and these southern structures are not generally available for this use during wet periods

Only the outlets to the Caloosahatchee (9000 cfs) and St. Lucie (7000 cfs) have an unconstrained discharge capacity (as designed during Central & Southern Florida Flood Control Project), and the total of both structures is less than half of what flows into the lake during wet periods.

Building new high capacity structures through the Herbert Hoover Dike would be costly.



CANAL CONVEYANCE

Moving water through the existing canals

EAA canals have multiple purposes; they provide both flood control and water supply

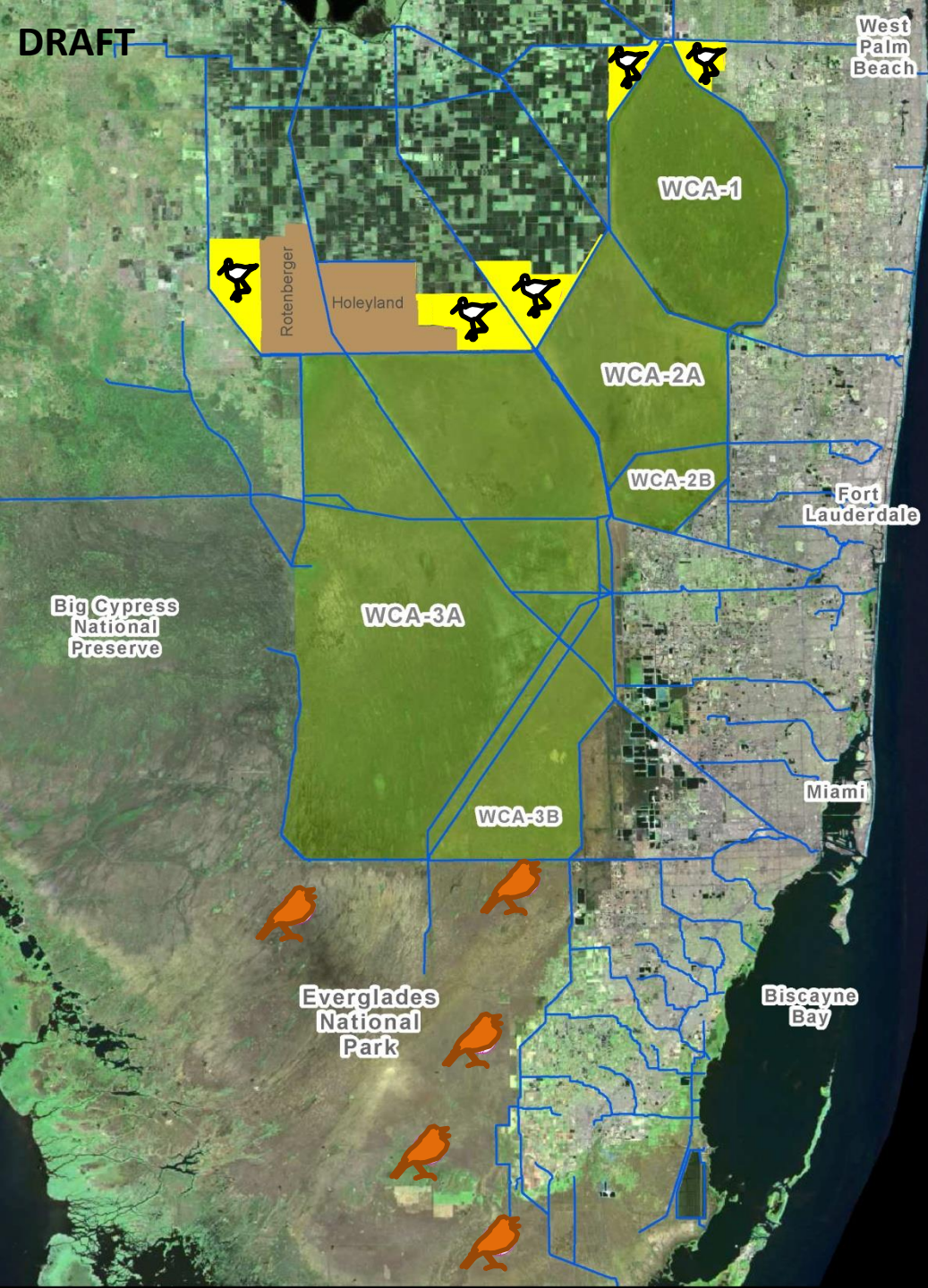
At times, the canal capacity is completely taken up with local basin runoff (rainfall), or the canals must be drawn down in advance of a forecasted storm.

At other times, meeting the water supply needs take up the entire canal capacity, leaving none to deliver additional Lake water to the Everglades

Making large releases from the Lake to the Water Conservation Areas (WCAs) would require a significant enlargement of the primary EAA canals.

People, businesses and cities in the EAA must be protected under any plan to move additional water through the system

Similar constraints to moving water through the Caloosahatchee and St Lucie outlets occur only at the highest flow rates.



SPECIES PROTECTION:

The Migratory Bird Treaty Act (MBTA) protects nesting birds under federal authority separate and in addition to the Endangered Species Act (ESA).

This presents a major constraint on the operations of the Stormwater Treatment Areas (STAs).

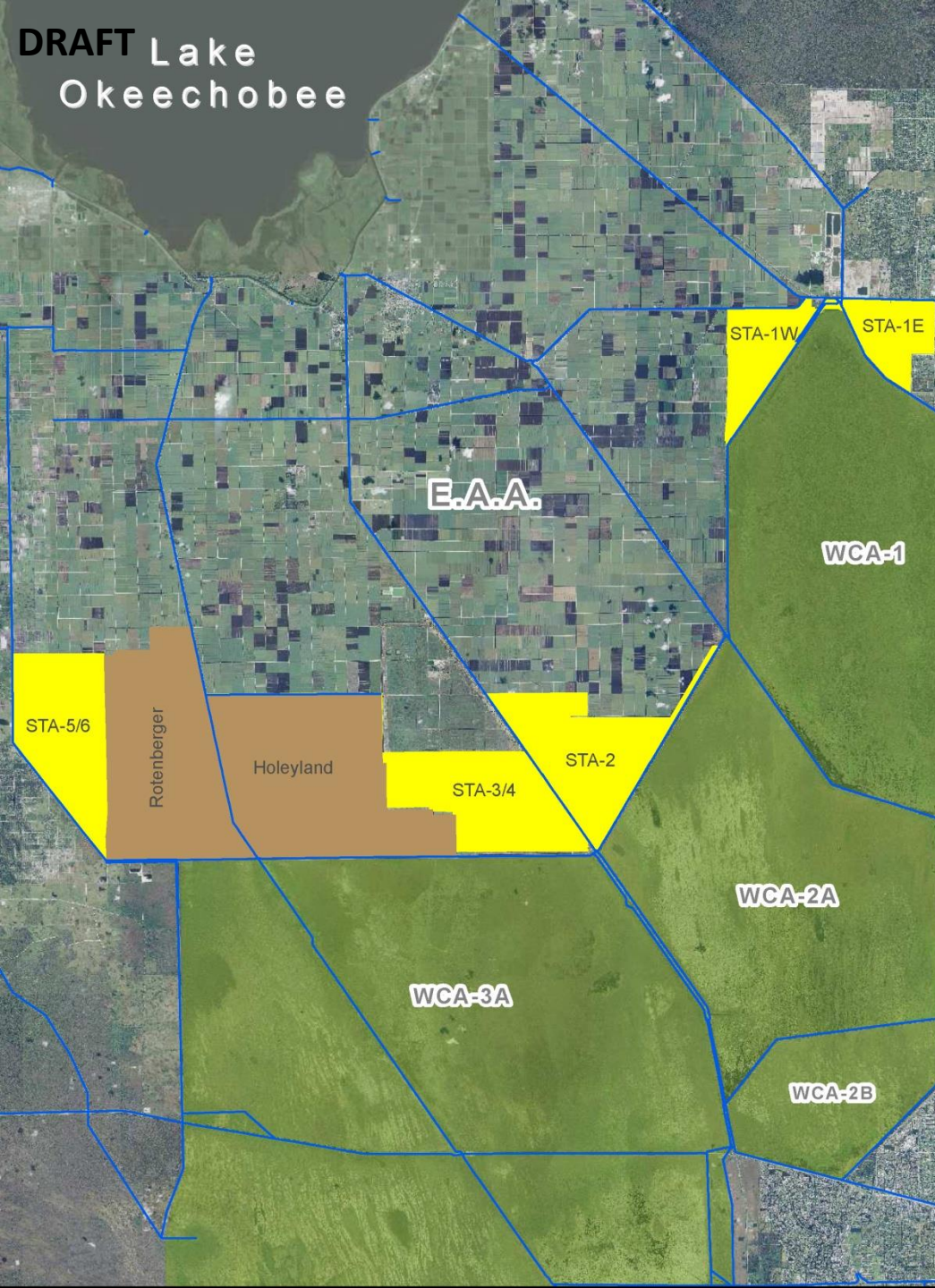
Migratory birds nesting in the STAs limit how much water we can process before moving it south.

The US Fish and Wildlife cannot give the SFWMD authority to move water over nests. Putting water in the STAs could be a potential violation of federal law.

The Endangered Species Act has led to very strict limits on hydrologic changes in key areas of the Everglades.

In the case of the Cape Sabal Seaside Sparrow, too much water in the southern Everglades is the problem.

This constrains how much water can be sent south.



STORMWATER TREATMENT AREAS: TREATMENT CAPABILITY

The STAs are necessary to meet state and federal water quality regulations. They are required by state law and Federal Court rulings.

STAs were not designed to treat significant amounts of water from Lake Okeechobee

Sustained large Lake releases to the south result in water depths and nutrient loading that could cause substantial damage to the treatment works.

The South Florida Water Management District (SFWMD) attempts to avoid substantial damage by limiting STA inflows, or in the event of extreme storm events, by temporary diversion of untreated water around the STA.

The performance of the STAs must be held within very strict limits specified in Federal and state law.

CERP anticipated storage north of the Lake plus ASR, to store water to deal with the excess water from north of the lake.

Storage of water NORTH of the Lake provides the flexibility to meet environmental and water supply needs in the entire Lake Service Area.

PUMP CAPACITY:

The capacity of the pumps needed to move water is a hard constraint on how much water can be moved through the EAA and STAs

Every drop of water has to be pumped from the EAA into the STAs and then it has to be pumped again to the Water Conservation Areas (WCAs).

These pumps were designed as flood control structures during the Everglades Forever Act in the early 1990s.

There are limits on how much water you can move in and how much you can move out.

Both the structural changes and operational costs associated with moving significant Lake releases to the Everglades would be very expensive.

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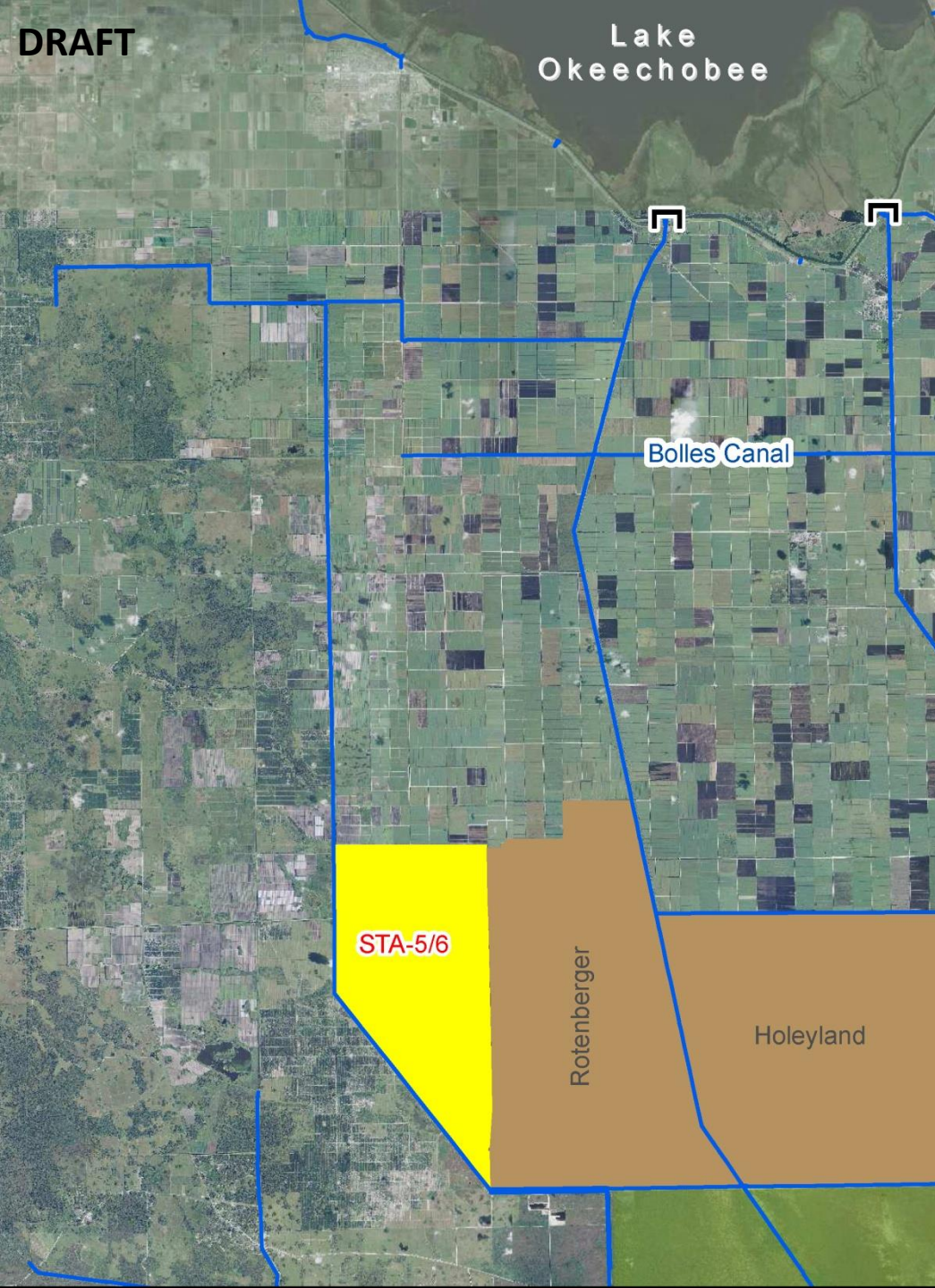
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STA 5/6 CONNECTIVITY:

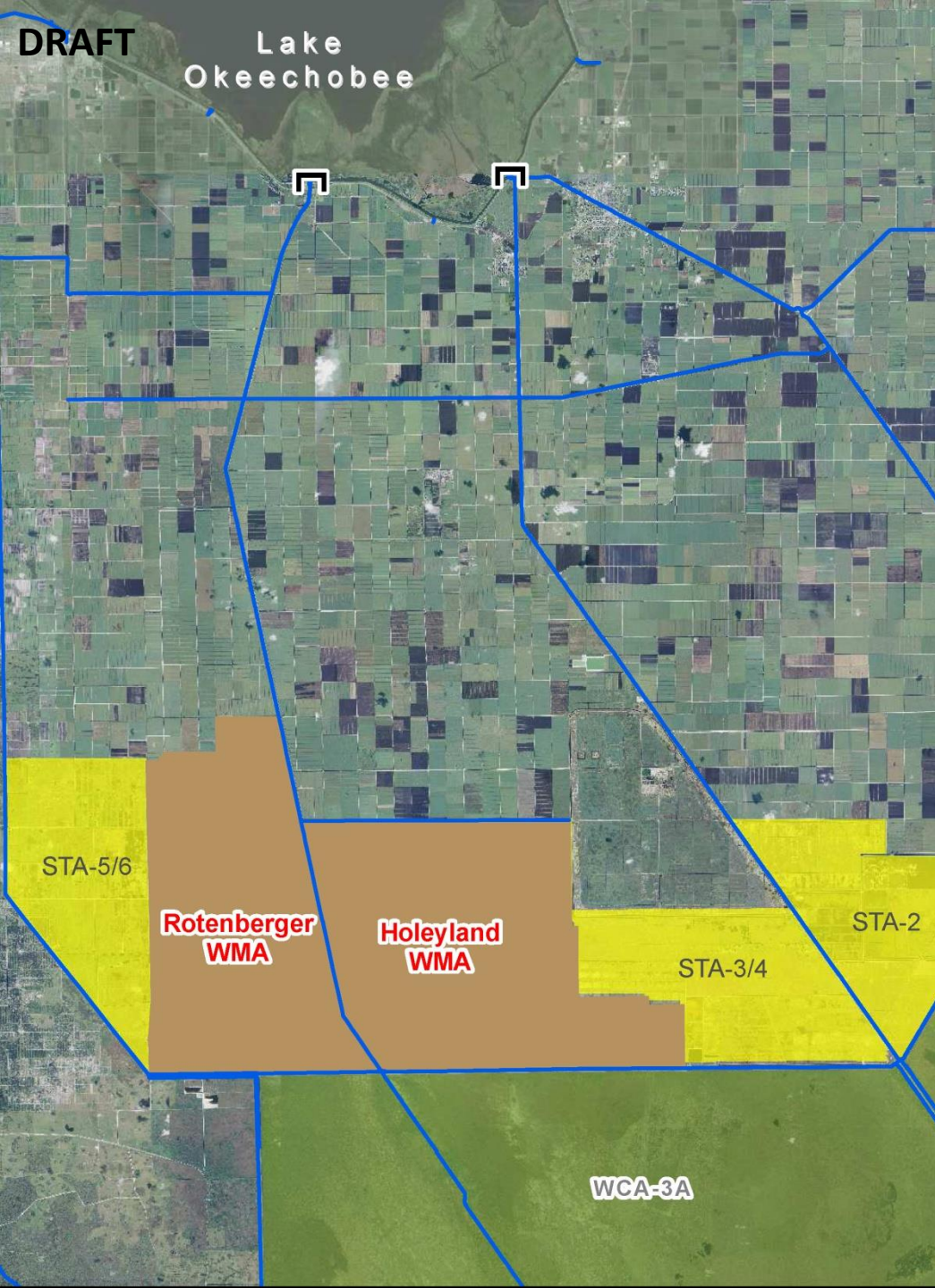
STA 5/6 was located to treat water from the C-139 Basin. Currently, there is no effective route to move water from Lake Okeechobee into STA 5/6.

Thus, one of the five STAs cannot physically receive water from Lake Okeechobee.

Creating a route to deliver meaningful flow to STA 5/6 would provide more capacity for the treatment of Lake Okeechobee water and would help balance STA loading.

Full utilization of the STAs we've already built would be a logical next step. Only STA-5/6 has untapped capacity to treat additional Lake water under certain conditions.

However, the other constraints in the system would make it difficult to use these STAs in wet years, particularly ones like 2013.



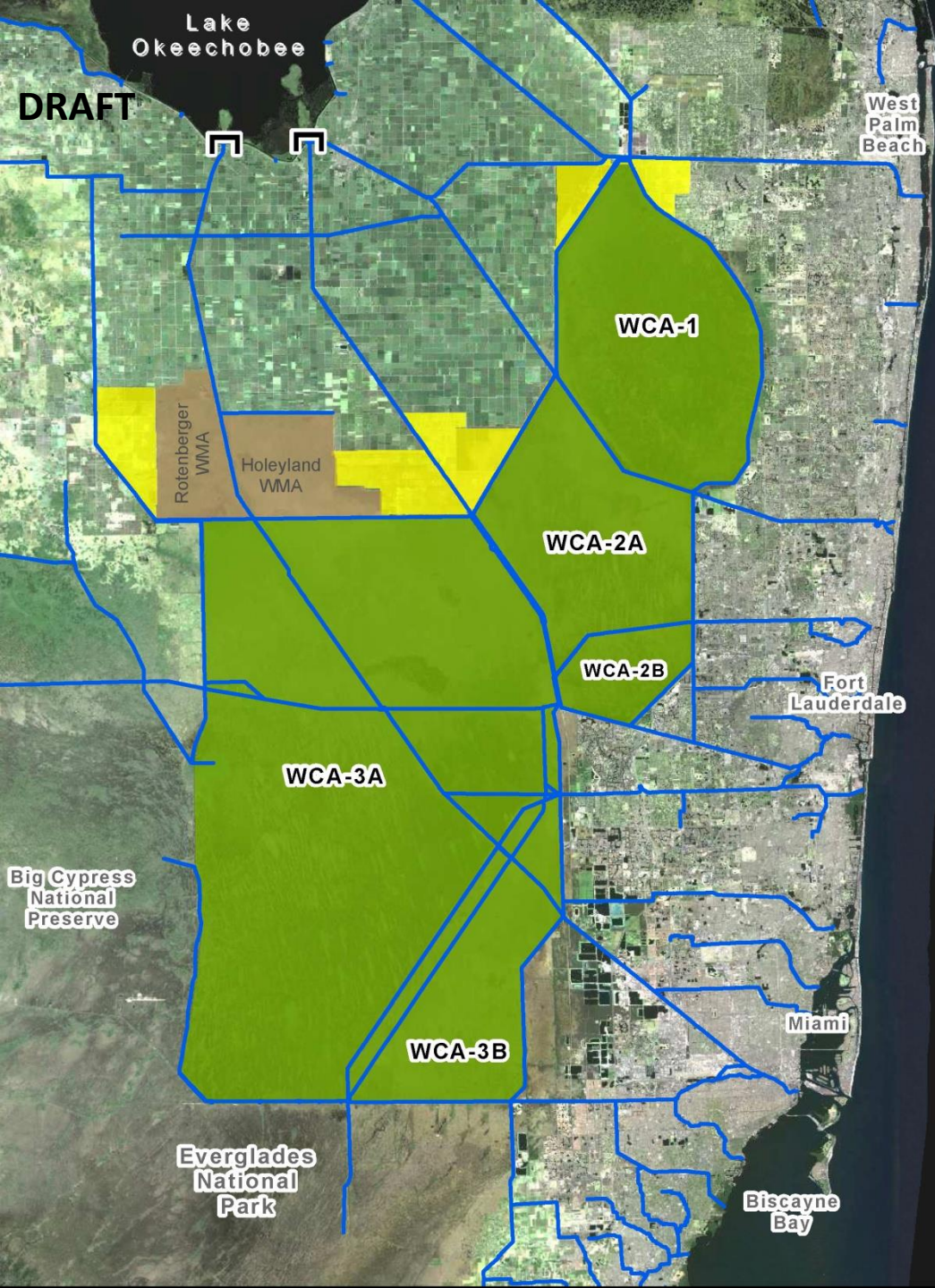
WILDLIFE MANAGEMENT AREAS between the STAs and WCA's

These areas have a different State-regulated operating regime.

Preventing excessive high water periods in areas in consideration of furbearing animals, enable water recession and ascension conducive to wading bird foraging.

Limited on how much water you can put in and how much water you can take out.

These areas are not currently used to take untreated water during Lake outflow events.



WATER LEVEL LIMITATIONS: WATER CONSERVATION AREAS (WCAs)

There are Federal water regulation schedules for each Water Conservation Area. When the water level is above schedule in a WCA, no Lake water can be brought in.

The WCAs cannot be treated solely as reservoirs. Each one has its own ecological conditions and together are major components of Everglades Restoration.

High water periods in Northern WCA areas must be limited to avoid harm to the full range of wildlife species that are protected in the Everglades and to reduce further degradation of tree island vegetation.

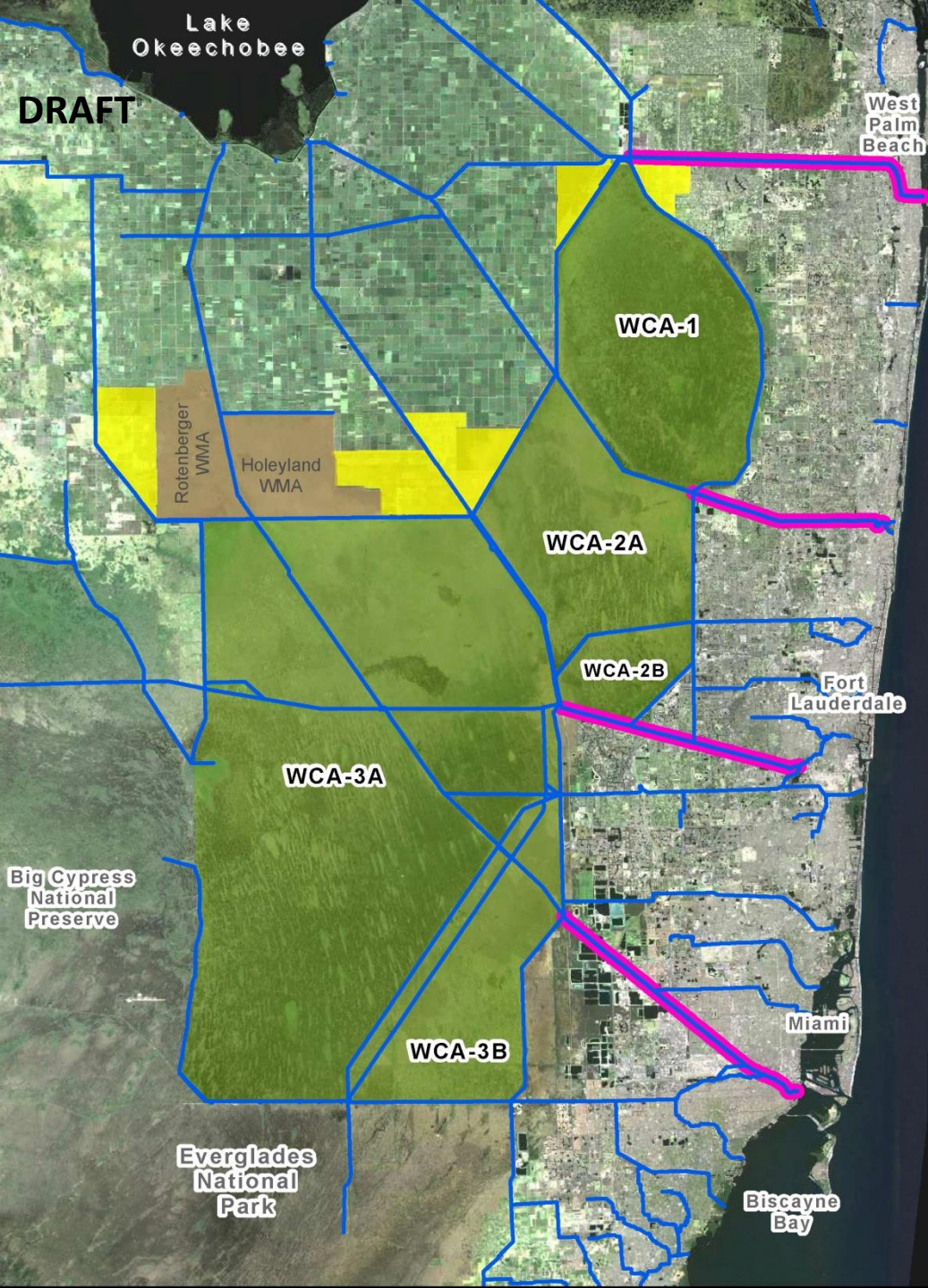
This prevents significant water from being diverted to the Water Conservation Areas during years when the Lake is making high releases to the coast.

Snail kite and wood stork: These endangered species depend on the habitat within the WCAs in the short term based on the hydrology of each year and in the long term based on the plant and animal communities that support them.

Unnatural variations of water levels, higher or lower, have a detrimental effect on cultural resources. This concerns both the Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida.

Water Conservation Areas have a huge impact on coastal urban water supply in Palm Beach, Broward and Miami/Dade Counties

During the 2013 rain event, not only was there heavy rain in the Lake watershed, The WCAs were also flooded. Water was above schedule, flooding tree islands, stressing wildlife and closing the area to the public while stopping water from going south.



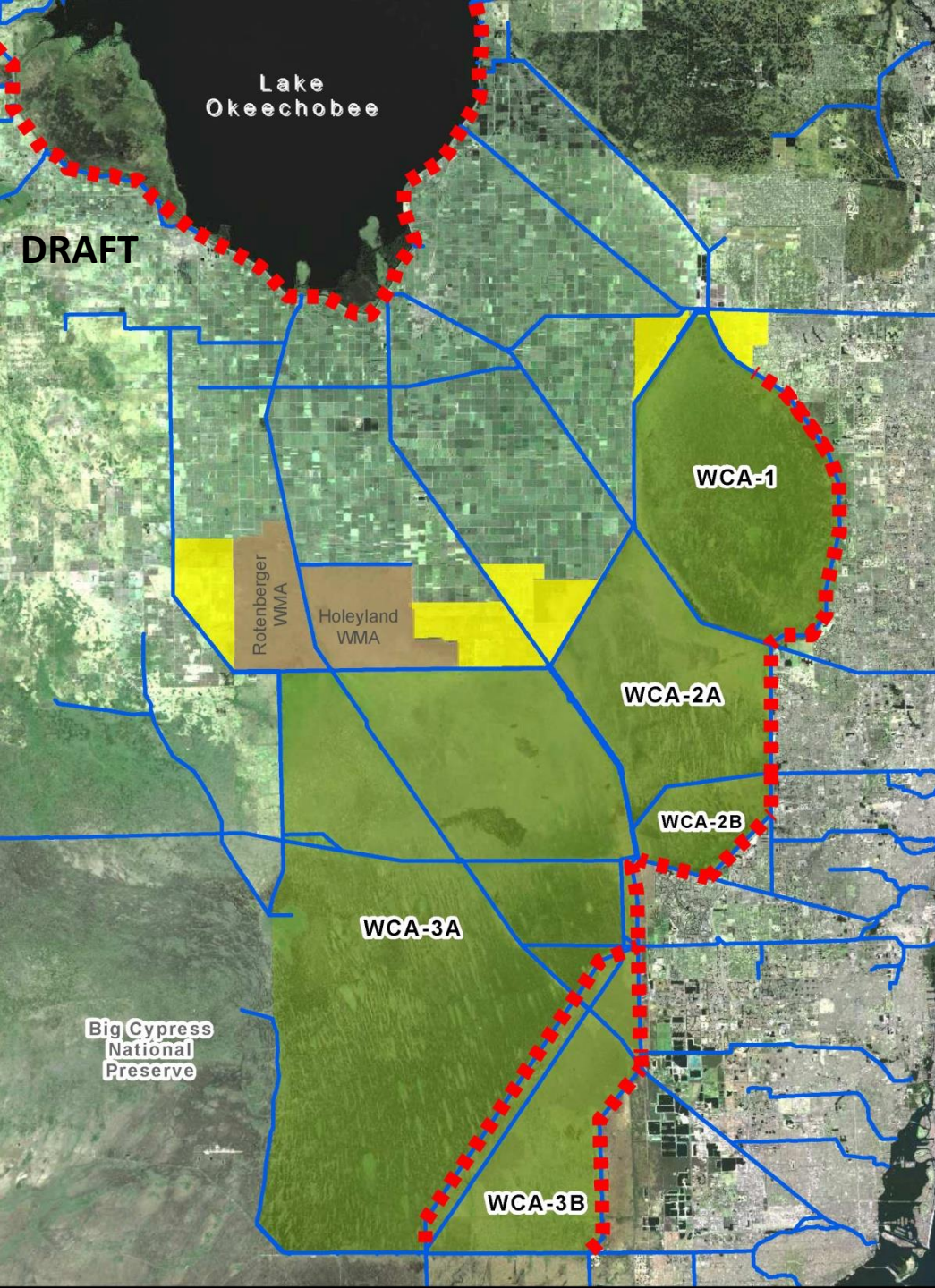
LOWER EAST COAST (LEC): CANAL CONVEYANCE:

Most of the time, these canals are used to provide flood control for the local areas. They are also routinely used to recharge the local urban aquifer.

During extremely wet periods in the Everglades, they are also used to release water from the WCAs, but they are small canals with very limited capacity for this use.

These canals are used to move flood control waters to the ocean to protect 5.5 million people in Palm Beach, Broward and Miami-Dade counties

Like every other area, local property must receive primary flood control before water can be moved from the WCAs.



LEVEE SAFETY:

The East Coast Protective Levee is the main barrier between the Water Conservation Areas and the urban coastal population.

\$20 million has been invested in this levee over the last several years to ensure it meets FEMA and flood control requirements.

WCA levee heights were designed/built based on maximum expected water levels in the Water Conservation Areas.

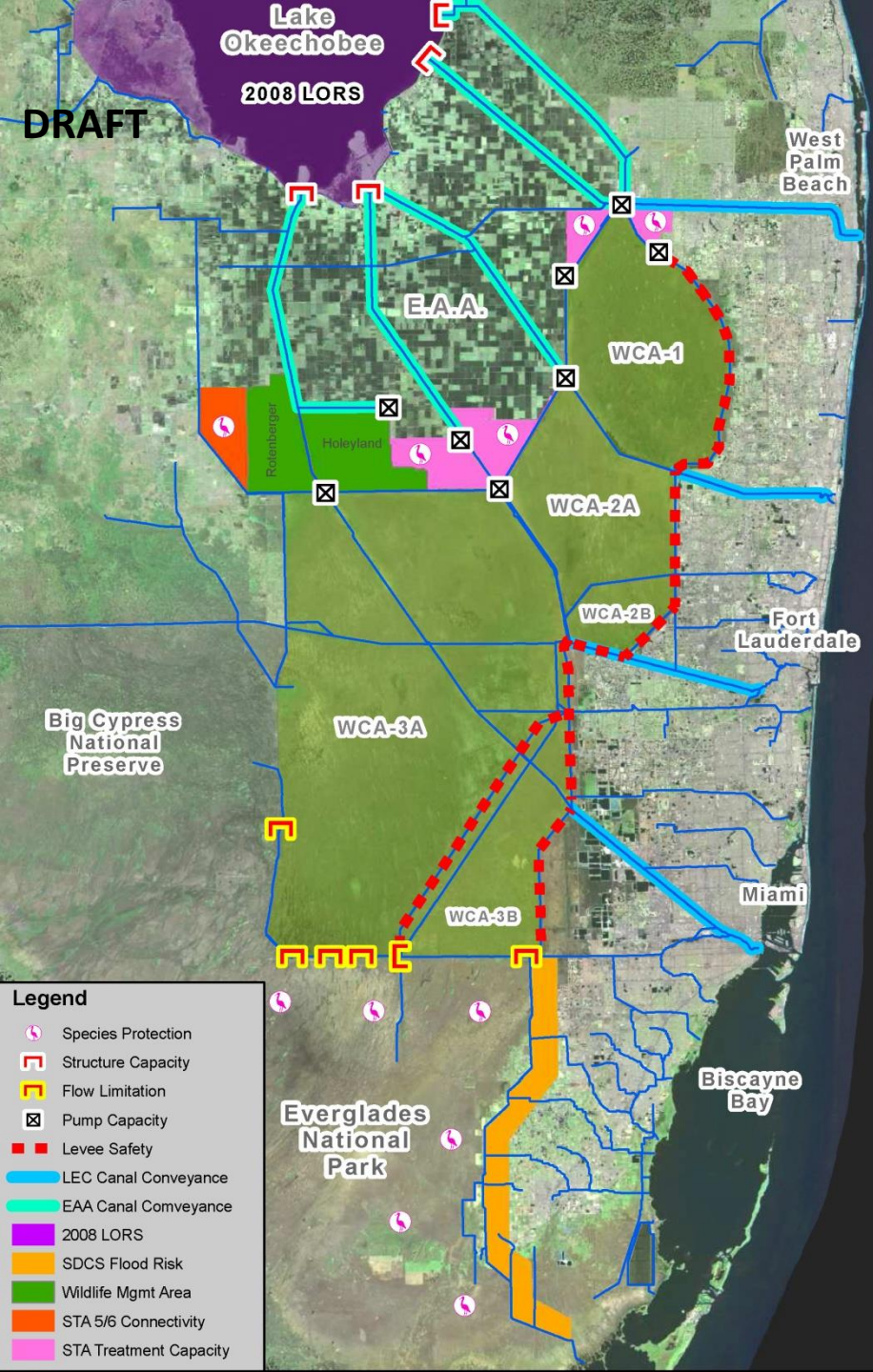
High inflow from the Lake during wet periods was not anticipated in the design of any of the WCA levees.

The regulation schedule for WCA-3A was lowered several years ago to address this concern.

A lower regulation schedule means less room for additional water from the Lake.

With rainfall, stages in the WCAs can change very quickly.

Getting water out of the lake, getting it through the EAA and being able to treat it in the STAs, and actually being able to put in into the WCAs when there is capacity is a significant challenge. Once there, it must be moved out or it will trip either environmental issues or dam safety issues.



FLOW LIMITATIONS:

For environmental reasons, a canal south of the S-12s that would have allowed large amounts of water from WCA3-A into ENP was never built. Not building it was a good thing for the Everglades, but it restricted how much water can go south.

Three major constraints to moving water south into Everglades National Park have been documented:

- Conveyance restrictions imposed at the S-12 structures
- Conveyance restrictions imposed by the Old Tamiami Trail
- The limited ability to flow water into the east side of the Park

In addition there is an Endangered Species challenge in the Park, the Cape Sable Seaside Sparrow.

The Sparrow restricts the operations of the S-12A and S-12B structures. They are shut down, one in November and one in January, through July 15, a period when large Lake releases are often made.

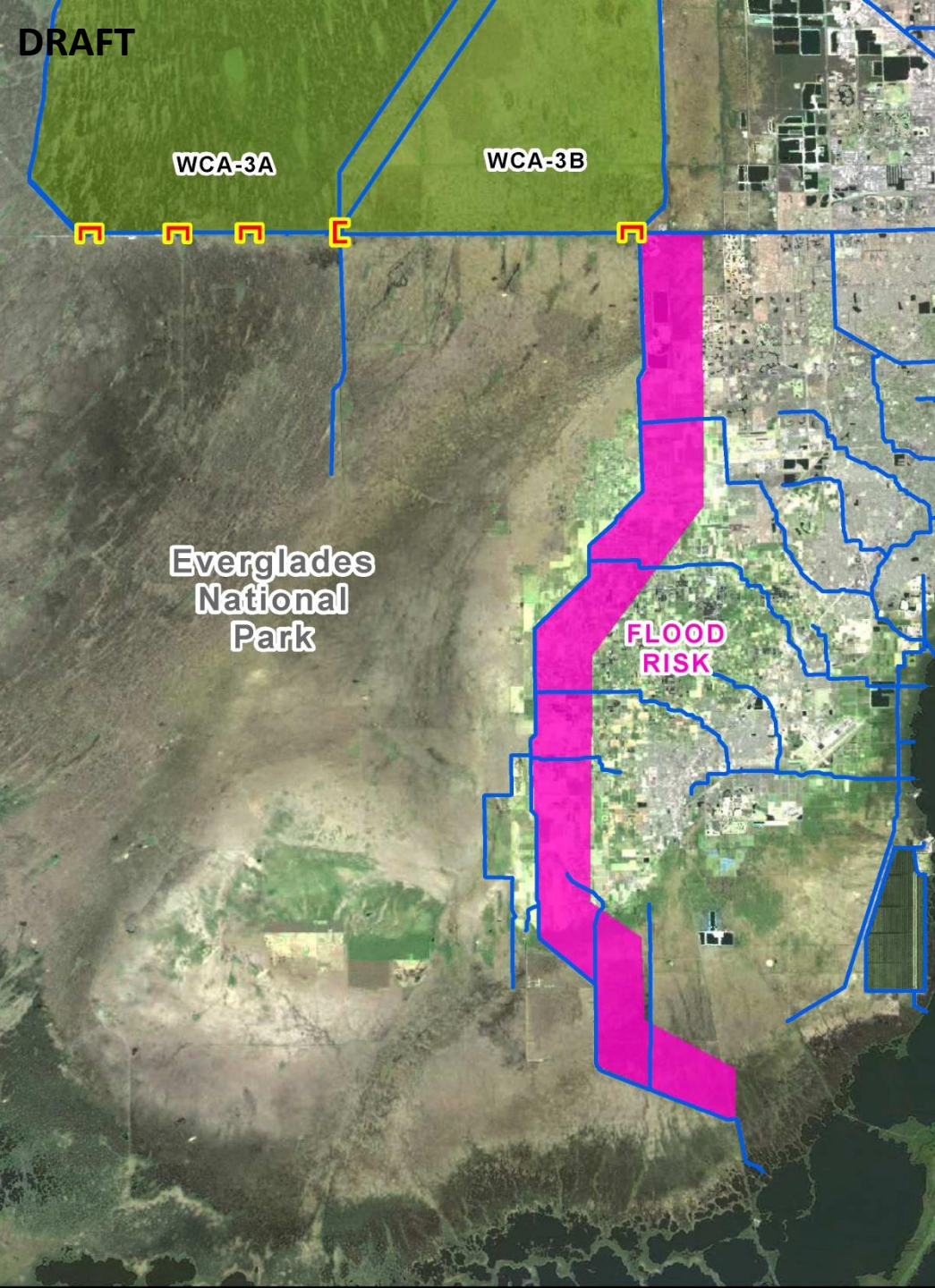
Two emergency projects have been pursued to incrementally improve the first two constraints:

- Removing vegetation at S-12A and S-12B
- Cutting a new gap in Old Tamiami Trail

A federal process is underway to begin limited flow into the eastern section of the Park. This will be a multi-year effort and does not include the prospect of major releases from the Lake.

Structures to effectively move water into WCA-3B have not been constructed.

This inability to move water out of the south end causes the water to stack up in the WCAs and stops the flow of water moving south.



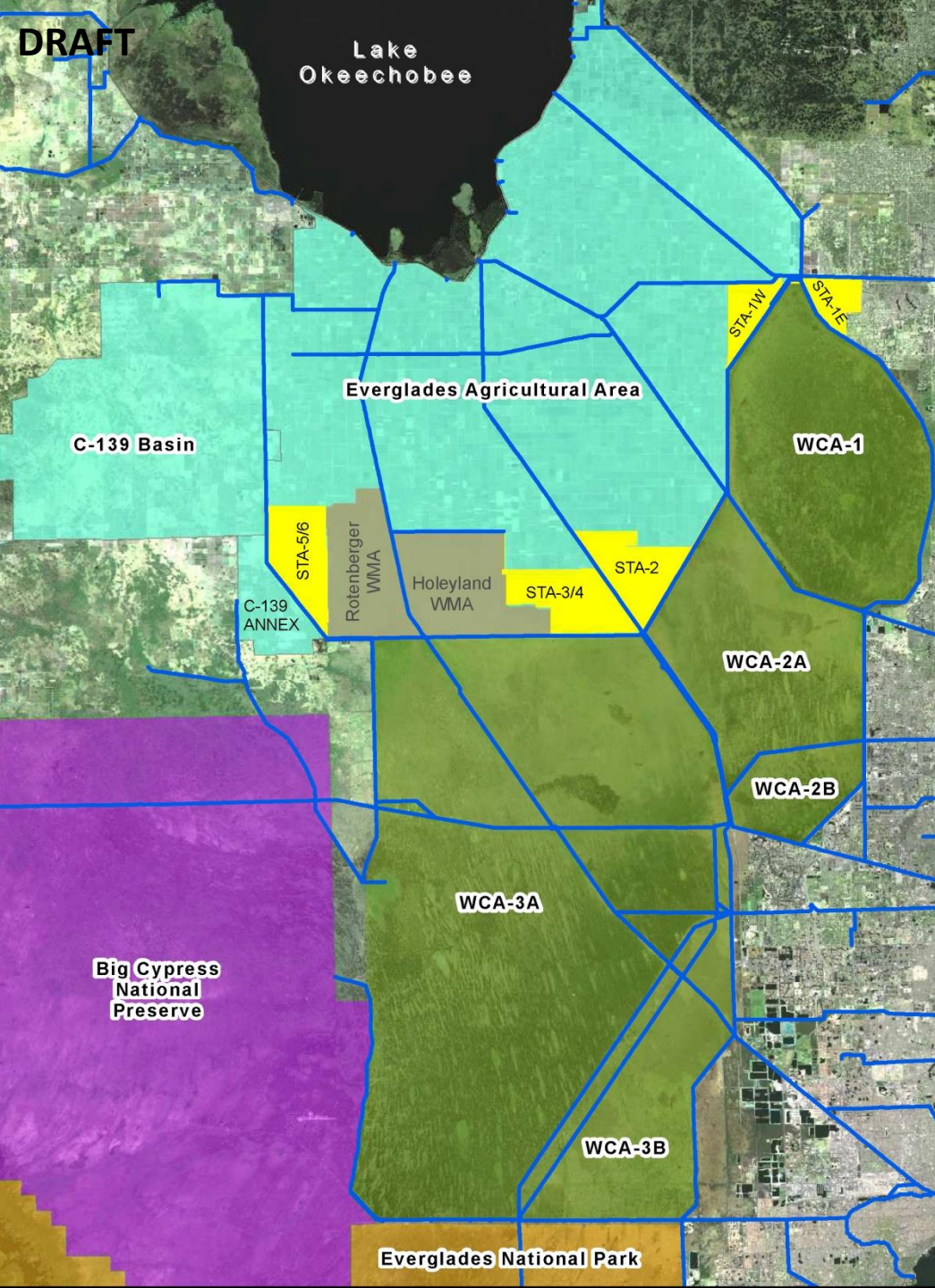
FLOOD RISK:

South Dade Conveyance System

A primary mission of the C & SF Project is flood control. Many of the canals, levees and pumps were built, and still must be operated, for that specific purpose. As more water is sent to Everglades National Park, facilities have to be in place to make sure flooding is not made worse for the private property east of Everglades National Park.

This is a key constraint on the design and operation of the Modified Water Delivery and C-111 Projects. These projects were not designed with an assumption of significant additional water coming through the Everglades from Lake Okeechobee.

Groundwater seepage from the Park is a chronic, existing problem, and significantly more water would only add to the challenge.



PHOSPHORUS REQUIREMENTS FOR THE EVERGLADES PROTECTION AREA

Maintenance of state water quality standards is crucial to the ecology of the WCAs and Everglades National Park

Legal requirements to reduce phosphorus levels in discharges and achieve water quality standards:

1992 (and amendments) Settlement

Agreement/Consent Decree (Appendix A & B)

Appendix A—Everglades National Park

Appendix B—Loxahatchee National Wildlife Refuge

1994 (and amendments) Everglades Forever Act

Numeric phosphorus criterion throughout the EPA marsh/WQBELS

Projects to achieve and maintain water quality standards:

EAA and C-139 BMP Program (from 1996)

STAs (1994-2012)

Restoration Strategies Expanded STA/FEB (from 2013)

Integration with Federal Projects:

Modified Water Deliveries

CERP Projects (CEPP)

Settlement Agreement & State Phosphorus Requirements:

WCA-1 (Wildlife Refuge, Federal)

Settlement Agreement Appendix B and

State Phosphorus Rule (10 ppb)

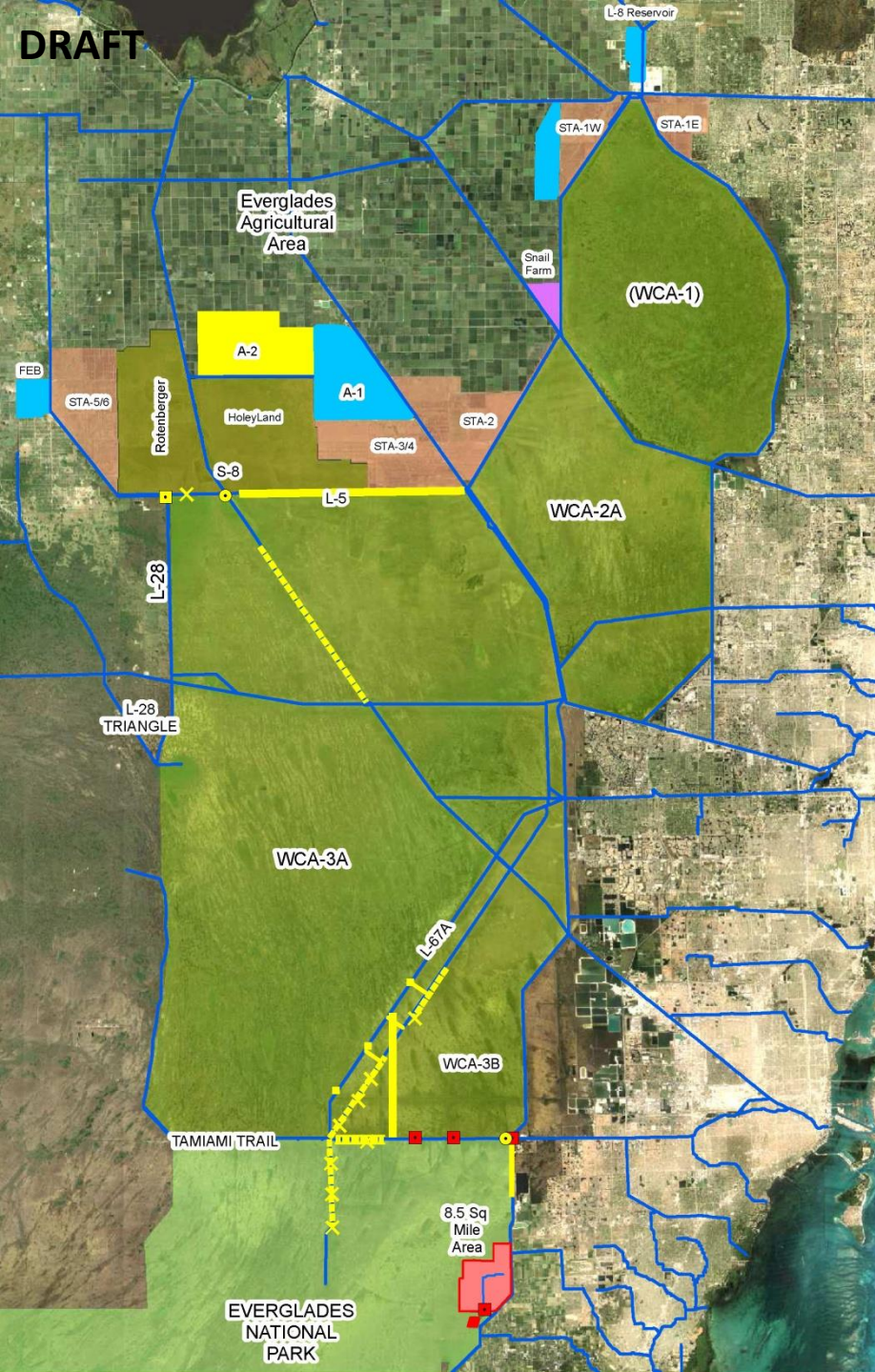
WCA-2 & WCA-3

Settlement Agreement does not apply

State Phosphorus Rule (10 ppb)

Everglades National Park

Settlement Agreement Appendix A (Appendix A also adopted the State Phosphorus Rule in the Park, 10 ppb)



Projects in the Queue

Three major projects that are necessary to consistently move excess Lake water to the south are either underway or in process. When completed an annual average of 210,000 acre-feet of Lake water can be sent south.

The Restoration Strategies Project (**shown in aqua**) is an \$880 million project so runoff from the EAA, and a limited amount of Lake water, can meet final water quality standards. The project is scheduled to be fully operational in 2029.

The Modified Water Deliveries Project (**shown in red**) is essentially complete but will not be fully operational until 2020.

The Central Everglades Project (**shown in yellow**) has a cost estimate of \$1.9 billion and is necessary to move additional water south. The plan has been approved by the USACE, but not authorized by Congress. Full operation is forecast in the 2030-2040 time frame.

Constraint Status - 2013

Much higher than average rainfall was recorded early in the wet season of 2013.

The upstream watershed produced very high inflow to the lake causing a rapid rise in lake level. At the same time excessive rain to the south led to deep water in the Everglades that threatened extended harm to the ecology.

The constraints described in the previous pages significantly prevented sending flow to the south from the lake. This reflects the reality of how constrained the system was designed for water management.

The conveyance capacity to the coastal estuaries were the only option to prevent potentially dangerous high levels in Lake Okeechobee.

Constraint Status - 2014

Rainfall conditions in 2014 were much closer to normal throughout the system.

While the lake stage was slightly higher than desirable for part of the year, conditions allowed most of the regulatory flow from the lake to be sent south.

The conveyance conditions through the EAA and the STAs were carefully monitored by the District and significant volumes were diverted south without jeopardizing the STAs or the Everglades.

The District was able to move small volumes of Lake O water through the STAs throughout the wet season without degrading water quality treatment within the STAs. The level in WCA-3A remained below the threshold for direct releases into south Miami-Dade so the flood risk there was manageable.

SUMMARY

- The system has been designed to send Lake Okeechobee water east and west to the Atlantic Ocean and the Gulf without hydrologic constraints
- Numerous hydrologic, ecologic and legal constraints can make it impossible to send lake water south when Lake Okeechobee stages are high and the estuaries are receiving high discharges
- In normal years, some water can be sent south when the various constraints allow it
- Until the Modified Water Delivery Project, Restoration Strategies plan and CEPP are built, no significant amounts of additional lake water can be sent south during wet years
- When those projects are built, an additional average of 210,000 acre-feet can be sent south, but only when the constraints allow it
- Additional strategies to move water south in concert with addressing the problems of the Northern Everglades, Lake Okeechobee and the estuaries must be developed in the future.